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JOURNAL

OF THE

MASSACHUSETTS ASSOCIATION

OF

BOARDS OF HEALTH.

ISSUED QUARTERLY.

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W. S. FRENCH, WEST NEWTON, MASS.

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OF

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1891.

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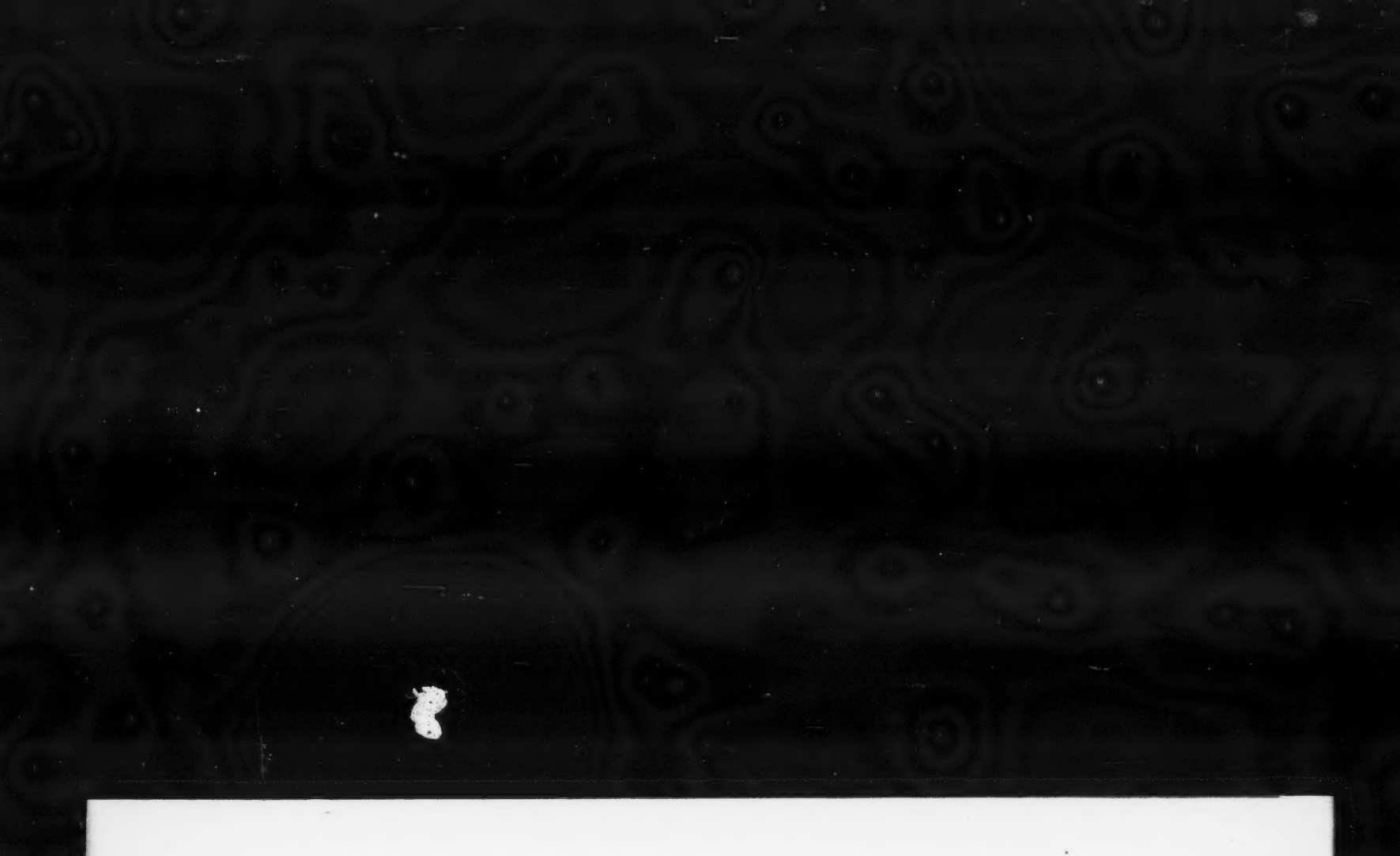

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MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

ORGANIZED 1890.

Vol. I. January, 1892. No. 4.

This Association, as a Body, is not responsible for statements or opinions of any of its members.

QUARTERLY MEETING

OF THE

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

Held in Boston, Friday, July 24, 1891.

The sixth quarterly meeting of the Massachusetts Association of Boards of Health was held in Boston, July 24, the members being the guests of the Boston Board of Health. Sixty-five members of the Association assembled at Battery Wharf at one o'clock, where they went aboard the steamer "J. Putnam Bradlee" and proceeded down the harbor. The Moon Island outlet of the improved sewerage system was first visited, for the purpose of observing the discharge of the sewage into the bay.

The reservoirs contained about twenty-five million gallons of sewage, which was discharged in half an hour. No landing was made here at this time, but the cruise was continued down the harbor below Boston Light, where the Barney dumping scow was awaiting the arrival of the Association. As the "Bradlee" approached the dumper a signal flag was waved, and the boat was seen to divide lengthwise from the bottom, and discharge her cargo of refuse into the sea.

The steamer's prow was again headed onward, and another visit was made to Moon Island. This time a landing was made, the party went ashore, inspected the reservoirs for storing sewage, the methods of filling and emptying them were explained, and the system of flushing the reservoirs was shown. Boarding the "Bradlee" again the company proceeded to Galloup's and a landing was made there. In

the storehouse tables had been laid and a clambake was waiting. The menu consisted of fish chowder, baked clams, with corn, boiled lobsters, cold tongue, watermelon, coffee and cigars, with rolls, crackers, etc.

After justice had been done the spread, the meeting was called to order by the vice-president, Dr. Durgin, chairman of the Boston Board of Health, in the absence of the president, Dr. Walcott of Cambridge, who was unable to be present.

The records of the last meeting were read and approved.

Vice-President Durgin — The first business before the meeting will be action on the propositions for membership.

The Secretary — I have the following list of applicants for membership who have been passed by the Executive Committee, and are recommended to the Association for election: —

E. Edwin Spencer, M.D., City Physician, Cambridge.
B. F. Thomas, Quincy.
Charles D. Burrage, Gardner.
John W. Cosden, Boston.
Joseph E. Clark, M.D., Medford.
Allen Greenwood, M.D., Waltham.
Samuel Friebe, Waltham.
E Irving Smith, Waltham.
F. Herbert Snow, City Engineer, Brockton.
Charles Smith, Fitchburg.

By vote of the Association all the foregoing parties were unanimously elected to membership.

Vice-President Durgin then introduced Mr. Frederic P. Stearns, chief engineer of the State Board of Health, who read a paper describing the present system of intercepting sewers in Boston.

At the close of the reading Mr. Stearns was greeted with hearty applause.

Vice-President Durgin then introduced Mr. E. P. Fisk, clerk of the Metropolitan Sewage Commission, who spoke in place of Engineer Carson, relative to the present condition of the work on the Metropolitan systems of sewerage.

A vote of thanks was unanimously adopted to the Boston Board of Health for its hospitality. The members then returned to Boston on the steamer

QUARTERLY MEETING

OF THE

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

Held in Springfield, Oct. 30, 1891.

The seventh quarterly meeting of the Massachusetts Association of Boards of Health was held in Springfield, Oct. 30. The members of the Association gathered at the Cooley House, but unfortunately only a small number responded to the call of the President, Dr. Walcott.

After testing the quality of the delicious viands set before them, the President called the meeting to order.

The records of the last meeting were read and approved.

President Walcott then introduced Dr. Walter H. Chapin, City Physician of Springfield, who spoke upon the "Propagation of Tuberculosis," receiving close attention, and being listened to with much interest.

A general discussion upon sanitary topics followed Dr. Chapin's remarks, after which the meeting adjourned.

NOTE.— Dr. Chapin's remarks not being in manuscript, he has kindly consented to write out the same, and they will be published in a future number of the JOURNAL.

THE BOSTON MAIN DRAINAGE WORKS.

BY FREDERIC P. STEARNS, CHIEF ENGINEER, STATE BOARD OF HEALTH.

I have been asked to supplement the information you have obtained by your visit to-day with a brief description of the works you have visited, the causes which led to their construction, and the results of their operation.

Before the Main Drainage Works were constructed the sewers of Boston discharged into the waters surrounding the city, at the most convenient outlets. In some instances the discharge was into the docks fronting on the harbor; in other instances into the estuary of Charles River, or the South and Back Bays, where extensive flats were laid bare at every tide. One large sewer had its outlet into the Roxbury Canal, in which there was no current.

As a result of these crude methods of sewage disposal, large portions of the city at the South and West Ends were affected by foul odors, particularly at night, and the sanitary authorities of the city and state on many occasions called attention to the necessity of having an improved system of sewerage.

At the end of 1874 the City Board of Health sent to the City Council a special communication relative to the necessity of improved sewerage, urging that action should be taken, after which there were no very long delays. A commission was appointed to devise a scheme, and not long after they reported the work was inaugurated.

General Principles of the Scheme Adopted.

The scheme adopted proposed to intercept the sewage near the outlets of the existing sewers and convey it promptly five miles down the harbor, where it could be discharged into the outgoing tide, which would carry it as much further from the city, and dilute it so that all trace of it would be lost.

The Boston sewers are built upon what is known as the "combined system"; that is, they receive both sewage and storm-water. The

volume of the latter during heavy storms is a great many times the volume of sewage proper, and it was evident that it was not feasible to construct works to carry all of the storm-water to the remote outlet. The works, therefore, were designed to take the dry-weather flow of sewage, and only a small amount of rain-water. In the case of light rains all of the water is taken; but in the case of heavy storms, after the intercepting sewers are filled to the maximum height by the earlier part of the storm, the surplus storm-water, containing some sewage, passes out through the old outlets, which are retained for the purpose.

Principle Features of the Works.

The principal features of the works are:

(1.) Intercepting sewers along the margins of the city to intercept the flow of the common sewers.

(2.) A system of automatic regulators and tide-gates.

(3.) A main sewer to convey the sewage to a pumping-station on the shores of Dorchester Bay.

(4.) The pumping-station.

(5.) The high-level outfall sewer leading from the pumping-station to the reservoir, which may be subdivided into three parts:

(*a.*) The deposit sewer.
(*b.*) The tunnel under Dorchester Bay.
(*c.*) The high-level sewer between the tunnel and the reservoir.

(6.) The reservoir at Moon Island.

(7.) The low-level outlet sewer through which the sewage is discharged from the reservoir.

Intercepting and Main Sewers.

These sewers vary in size from about three feet in diameter at their upper ends to ten and one-half feet near the pumping-station. At their upper ends they are placed as high as they can be and be efficient, and from there they have a constant slope to the pumping-station. This slope was made as small as will produce a sufficient current in the sewers to prevent them from becoming foul, and for the largest sewers is only 1 in 2,500; but notwithstanding this very small slope, it was found necessary to place the bottom of the main sewer at the pumping-station fourteen feet below the level of low tide.

The automatic regulating apparatus and tide-gates need not be described here, but it may be well to state that they were all designed especially for these works, and have operated without failure from the beginning.

Pumping-station.

When the sewage first arrives at the pumping-station it passes through coarse screens or "cages," which retain substances that might otherwise clog the pump-valves. These cages are arranged in pairs, so that when one is drawn up for cleaning another remains in place to screen the sewage. The quantity of material caught is not very large, and consists of coarse paper, rags, half lemons, banana-skins, and similar substances The matter removed is not especially offensive, and after being dried in presses is burned under the boilers.

After passing the screens the sewage flows into a gallery under the pumping-station, and thence into the pump-wells, from which it is lifted and forced through cast-iron pipes four feet in diameter to the deposit sewers. The total lift is about thirty-five feet.

The two great pumping engines were built from original designs, and though somewhat costly, are very economical in the use of fuel; the total amount of coal required to run one of them twenty-four hours and pump thirty million gallons of sewage being only four tons. The two smaller pumping engines will lift very nearly as much sewage as the others. They cost much less in the first place, but require nearly double the amount of coal to do the same amount of work. The reason for having two types of engines is this: Part of them are used constantly, day and night, to pump the ordinary flow of sewage, and it is important that these should be operated with the minimum amount of coal. The others are used only during storms, and the consumption of coal by engines which are operated only a small portion of the time requires less consideration than the first cost.

Deposit Sewers.

These are high-level twin sewers built of concrete, each eight feet wide and sixteen feet high. At their lower ends near the entrance to the tunnel are dams about nine feet high which cause the flow through these sewers to be very sluggish, and as a consequence all heavy substances are deposited here instead of being carried into the tunnel.

The deposits consist of sand and gravel, ashes, bits of paper, matches and other things, intermixed with more or less fecal matter. They are removed by a hydraulic process from these sewers to a wooden tank on the edge of the channel, and thence are put into scows and dumped into the ocean outside of the harbor, near where the garbage is dumped.

Tunnel.

The tunnel under Dorchester Bay has a total length of about a mile and a third. It was excavated in rock and lined with brick-work, so that it now has a smooth bore seven and one-half feet in diameter. The main portion of the tunnel is nearly level and about one hundred and fifty feet below high tide. The sewage enters it by passing down a vertical shaft, and rises again at the other end through an incline to the sewer which leads to the reservoir.

Reservoir.

The reservoir covers five acres, and will hold 25,000,000 gallons of sewage. It is surrounded by masonry retaining walls, and divided into four divisions by partition walls, so that any division can be kept empty for cleaning and repairs. The floor of the reservoir is of concrete, and in it are gutters paved with brick. The sewage is discharged about one hour after each high tide, when the outward current in the harbor is well established. The time occupied by the discharge is about forty minutes. While the sewage is in the reservoir some of the solid matter in suspension settles, leaving a light deposit about one-quarter of an inch in thickness. This deposit is removed after every discharge by flushing with large quantities of sewage previously stored in the sewers for the purpose.

Outlet.

The place at which the sewage is discharged has proved very satisfactory. The sewage being lighter than the salt water, rises to the surface, and at the end of a half hour after the discharge is begun, covers an area a half mile in diameter, which can be plainly seen by its color, and because it contains enough grease to still the waves. At the end of about another hour it has been so far diluted that no trace of it can be seen. After having disappeared from view it still flows outward for more than three hours, the currents continuing to

increase in force. No deposits of sewage matter have been found anywhere except close to the outlet in a cove which is sheltered from the current by the embankment covering the outlet sewers.

Results Obtained.

The question most frequently asked with reference to these works is, "Are they a success?" The question is occasionally brought forward by the newspapers and various answers are given, some of them more or less unfavorable. My own view is, that they are a decided success.

The fact that the sewage follows in the main the same course every tide, and yet does not seriously pollute the shores of the island which it passes, seems to be very strong evidence in favor of its not polluting any more distant shores. The rapid disappearance of the sewage by dilution prevents it from being objectionable after being discharged, except in the vicinity of the outlet in summer, when the sewage discharged is certainly disagreeable to yachtsmen passing through it. It is very rarely that any odor from the works can be noticed at any dwellings except those owned by the city on Moon Island. These favorable features with regard to the outlet will be better appreciated by contrasting them with the former method of disposal when the sewage was discharged at all stages of the tide into slight currents where it could not be sufficiently diluted, and where the solid particles were deposited upon the flats in the vicinity of habitations.

The discharge of dilute sewage during heavy storms through the old outlets could not be avoided, but this takes place so small a proportion of the whole time (on an average not over one hour in one hundred) that no serious trouble is caused by it.

The works were not designed to purify the sewage before its discharge; but the removal of the coarse substances, and of the heavier matters to the extent of about six thousand cubic yards per year by the deposit sewers, undoubtedly has something to do with the absence of deposits or stranded substances below the outlet.

The works in addition to furnishing a proper outlet for the sewage of the city have greatly improved the condition of many of the city sewers built at a low level through filled land. These sewers were formerly dammed up by the tide much of the time, which stopped all current and caused the solid matters of the sewage to deposit and

putrify. Now that they have a free discharge into the intercepting sewers, regardless of the stage of the tide, they have a constant cleansing current in them.

In closing I will refer to the success of the works from a strictly engineering point of view, and will say that in addition to the magnitude and boldness of the scheme as a whole, the works had to be designed in detail with comparatively little guidance from existing works in any part of the world; and the fact that they have operated successfully without stopping and without any important changes since the day they were started, more than seven years ago, is a record which those who designed the works may well be proud of.

THE

METROPOLITAN SYSTEM OF SEWERAGE.

ITS PRESENT STATUS AND CONDITION.

BY EDWARD P. FISK, CLERK OF THE METROPOLITAN SEWERAGE COMMISSION.

Mr. President and Gentlemen: — The two systems of sewage disposal authorized by Chapter 439, Acts 1889, are designed to afford an outlet into deep tide-water for the cities and towns shown upon the map [referring to map exhibited]. After several investigations and recommendations, these systems, reported to the Legislature of 1889 by the State Board of Health, were adopted, and the commission appointed under the provisions of the act are to construct, operate, and maintain the two systems in substantial accord with the plans submitted with that report. The commission was organized Sept. 13, 1889, and the next month chose Howard A. Carson as its chief engineer, whose inability to be here to-day we much regret.

The North Metropolitan or Northern system, designed to afford relief to the cities and towns north of the Charles River, is the larger of the two, and will discharge near the Deer Island Beacon, while the Charles River, or Southern system, designed to afford relief for part of Boston, Brookline, Brighton, Newton, Watertown, and Waltham, joins the present Boston system at Camden Street, and will discharge through the outlet at Moon Island. Contracts have been made for the construction of the main sewer of the Northern system from the end of Deer Island to the Chelsea River (between East Boston and Chelsea), and also about three-fifths of a mile in Chelsea, excepting those portions covered by the tide-waters of Chelsea River, Belle Isle Inlet, and Shirley Gut; a total length of about thirty thousand feet, or something over five miles. This sewer is mostly nine feet in diameter, and at the present time there is completed about three and one-half miles of it. It is hoped to have the entire system in operation by August, 1894, although some portion of it may be put in operation earlier. The expenditures on this system to July 1, 1891, have been about half a million of dol-

lars. All of the Charles River or Southern system is under contract, and it is expected to be finished in season to be put in operation early in 1892. Its total length is about seven and three-fourths miles, of which some four and one-half miles are now completed, and the contracts call for the completion of the whole by the 1st of December, this year. The expenditures to July 1 have been more than two hundred and fifty thousand dollars

The size of the sewer on this system varies from three and three-fourths feet at the upper end to six and one-half feet where it joins the Boston system at Camden Street.

To meet the expenses of these two systems the State Treasurer is authorized to issue bonds, or certificates of indebtedness, to the amount of five million dollars, and the localities benefitted are to meet the requirements of the Sinking Fund and interest, as well as the cost of operation and maintenance, in a proportion, to be determined by commissioners appointed by the Supreme Court every five years, when their finding shall have been approved by said Court.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

MEMBERSHIP ROLL

JAN. 1, 1892.

NOTE.—The Secretary requests to be advised of existing errors or changes of address from that which appears in the following list.

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THE JOURNAL OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH is a quarterly publication containing the papers read at the meetings, together with verbatim reports of the discussion. It will also contain from time to time interesting contributions from writers of the highest standing in their profession. It affords a convenient medium for the interchange of information and experience between its members, who are so widely separated as to find frequent meetings an impossibility. Every addition to its subscription-list, therefore, is a material aid in extending its field of usefulness. All members of the Association receive the JOURNAL in return for their annual dues; to all others the subscription is two dollars per annum. If upon inspection of the accompanying copy you feel so inclined, we should be glad to receive your subscription. Address,

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